



Anaerobic Digesters Continue Growth in U.S. Livestock Market



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Construction of anaerobic digestion systems for livestock manure stabilization and energy production has accelerated substantially in the past several years. EPA estimates that there are currently about 111 digesters operating at commercial livestock facilities in the United States.

In 2007, farm digester systems produced an estimated 215 million kilowatt-hours equivalent of useable energy (Figure 1). Besides generating electricity (170 million kWh), some operations use the gas as a boiler fuel, some upgrade the gas for injection into the natural gas pipeline, and some flare gas for odor control. Many of the projects that generate electricity also capture waste heat for various on-farm thermal uses.

Digester Profiles

The majority of commercially operating systems (Figure 2) are plug flow and complete mix reactors (both tanks and covered lagoons) operating at mesophilic temperatures (95° - 105°F). The remainder of the

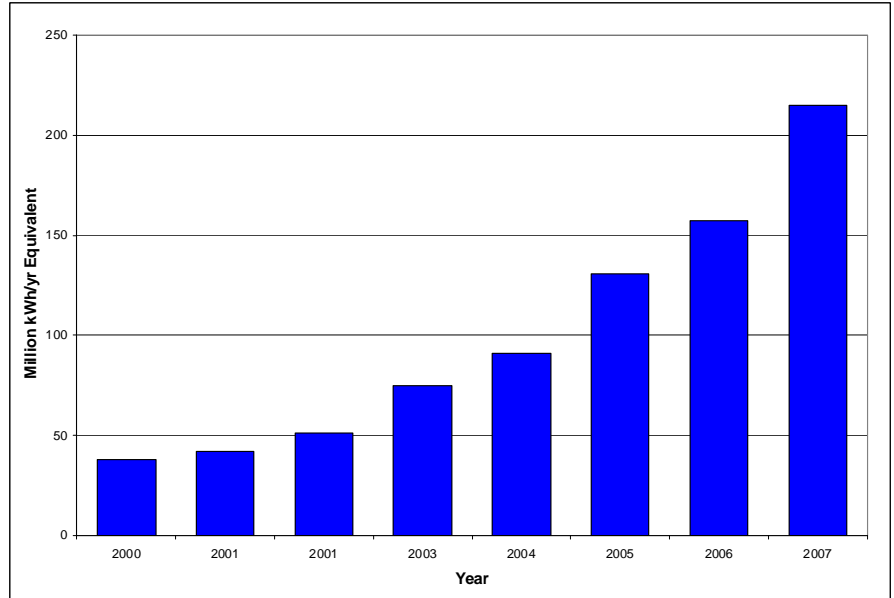


Figure 1. Trends in Energy Production by Anaerobic Digesters - 2000 through 2007

systems include covered lagoons operating at ambient temperature, and attached growth and induced blanket reactors. European-style complete mix systems are also emerging in the U.S. market.

Although the majority of systems are still farm owned and operated, using only livestock manure, other approaches are emerging. These include the commingling of high strength organic wastes (e.g., food waste, ag waste, cheese whey) to increase gas production per unit volume of reactor; third party owned/operated systems; centralized systems handling manure from multiple farms; and direct gas sales to customers or gas utilities. Most digester systems (80 percent) currently are found in the dairy industry in the Midwest, West, and Northeast (Figure 3).

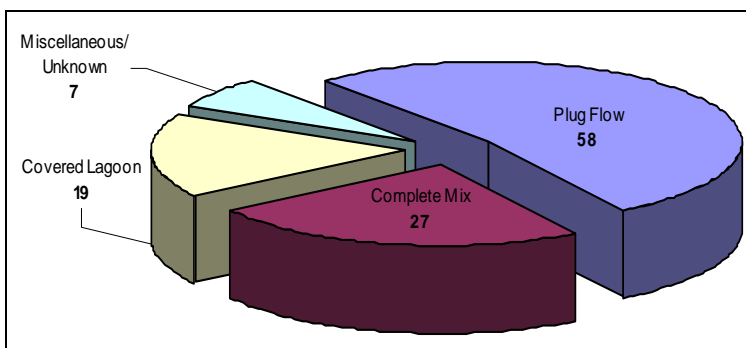


Figure 2. Number of Operating Anaerobic Digesters by Technology

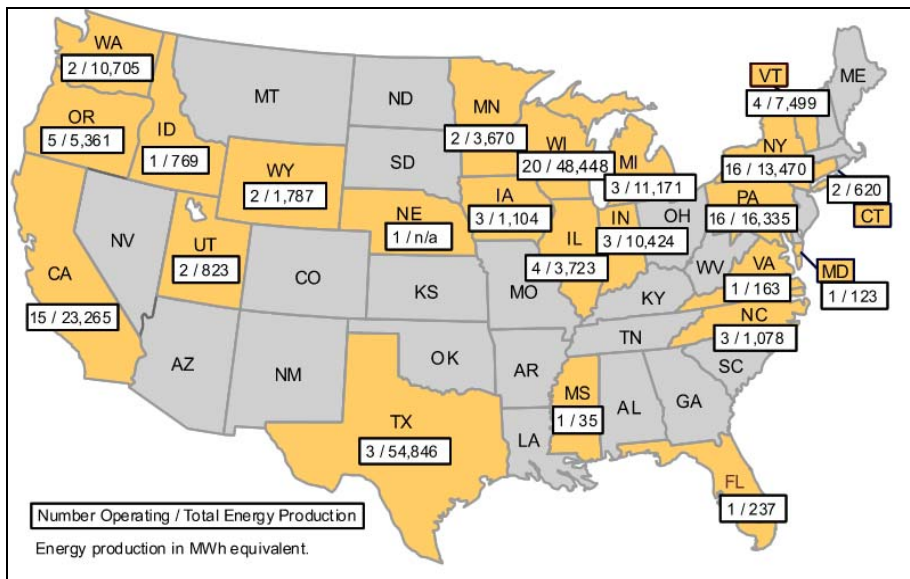


Figure 3. 2007 Operating Manure Digesters

Some of the factors that are influencing the growth in interest in anaerobic digester systems include:

- 1) improved digester designs and demonstrated biogas production and engine-generator set reliability,
- 2) concern about odors and other environmental impacts of manure management practices,
- 3) an increase in governmental cost share programs,
- 4) an increase in interest by utilities in purchasing electricity and biogas to meet renewable portfolio standards and green energy programs, and
- 5) the potential for sale of carbon credits to generate income.

Financial Incentives

Financial incentives have increased the deployment rate of manure digester systems. For example, grants awarded under Section 9006, Renewable Energy and Energy Efficiency, of the 2002 Farm Bill have been one

of the primary methods for farms to partially fund installation of commercially proven livestock waste digestion technologies. Since 2003, USDA has awarded a total of about \$31 million for anaerobic digestion systems (Figure 4).

A number of State programs have provided significant funding for the installation of anaerobic digester systems historically, with many more dedicating resources to this activity.

Some of the state programs providing funding include the California Energy

Commission, Iowa Department of Natural Resources, New York State Energy Research and Development Authority, Pennsylvania Energy Harvest Grant Program, Wisconsin Focus on Energy, and the emerging North Carolina Lagoon Replacement Program. While some of these programs have shifted to evaluating energy, economic, and environmental performance of operational systems, many still provide significant financial and technical resources to assist livestock producers in developing anaerobic digester systems.

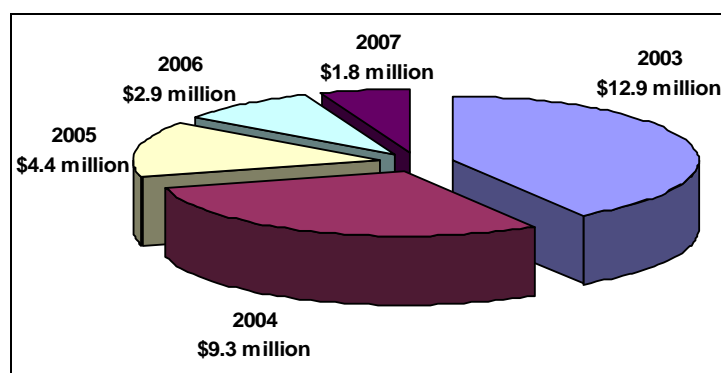


Figure 4. Annual USDA Funding for Anaerobic Digesters at Livestock Operations